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REMARKS

Claims 1-12 are pending in this application. In the present Amendment, claims 2, 11 and 12 have been canceled without prejudice or disclaimer, claim 1 has been amended, and new claims 13-16 have been added. Upon entry of this Amendment, claims 1, 3-10, and 13-16 will be pending.

No new matter is added by this Amendment. Support for the changes to the claims is as follows. In claim 1, the phrase "formed from a three-dimensional network structure" in the preamble has been deleted, and "wherein the organic polymer (A) and the water swelling clay mineral (B) interact to form a three dimensional network structure" has been added as the last clause. The term "copolymer of" in claim 1, line 4, has been replaced with "copolymer produced from". Support for this amendment may be found on page 15, lines 2-6, of the specification.

Support for new claims 13 and 14 may be found on page 6, last paragraph, to page 7, first paragraph. Support for new claim 15 may be found on page 19, lines 13-21. Support for new claim 16 may be found on page 11, lines 9-12.

Support for this Amendment is fully responsive to the Office Action dated April 2, 2007.

Regarding Election/Restriction. (Office action page 4)

Applicant confirms the election of Group I, claims 1-10. Withdrawn claims 11 and 12 have been canceled without prejudice or disclaimer.

Claims 1-5 and 9 are rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over JP 63028639 A. (Office action page 4)

The rejection is overcome by the amendments to the claims.

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Amended claim 1 recites a polymer/clay composite comprising:

- (i) an organic polymer (A); and
- (ii) a water swelling clay mineral (B);

wherein the organic polymer (A) and the water swelling clay mineral (B) interact to form a three dimensional network structure.

In the Office action, the Examiner states that JP '639A teaches a crosslinked composite formed from water soluble monomer(s) in the presence of 0.01-10% of clay and crosslinker, and that the clay is inherently water swelling.

Applicant notes that the English translation of the JP '639A abstract states:

An aq. soln. of such a monomer is added with radical polymerisation initiator (e.g. peroxide, hydroperoxide or azo cpd.) and opt. crosslinking agent (e.g.) in an amt. of 0.01-10 pts. wt. per 100 pts. (monomer(s) [sic] for improving the water-absorptivity and additive (e.g. talc, clay or diatomaceous earth) to provide aq. soln. having consistency of up to 60 wt.%.

Therefore, JP '639 discloses a crosslinked composite formed from water soluble monomers in the presence of:

- radical polymerization initiator,
- opt. crosslinking agent in an amount of 0.01-10 wt%, and
- additive (talc, clay or diatomaceous earth)

Applicant respectfully disagrees that JP '639A discloses that the added amount of clay is 0.01-10 wt%.

Applicant also here translates an additional portion of JP '639A (page 3, upper left column line 15, to page 3, upper right column, line 15) to English:

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As well as the monomer, a cross-linker and an additive can be further added for improvement of water-absorptivity. It is preferable, a water-soluble ethylene-type unsaturated polyvalent monomer, such as methylene bisacrylamide, ethylene glycol diacrylate, polyethylene glycol di(meth)acrylate, and polyglycerol poly(meth)acrylate; a polyglycidyl ether, such as ethylene glycol diglycidyl ether, poly glycerol polyglycidyl ether, sorbitol polyglycidyl ether, polyglycerol polycidyl ether; a polyol, such as glycerine and pentaerythritol; and a polyamine, such as ethylenediamine and polyethyleneimine, can be used as the crosslinker. The amount of the addition is generally 0.01-10 wt. parts per 100 wt. parts monomer. If the amount is more than 10 wt. parts, water-absorptivity decreases because that crosslinking density becomes too large, and if the amount is less than 0.01 wt. parts, the enough effect of crosslinking cannot be observed.

For the additive, the pulverized filler, such as talc, clay, diatomaceous earth, can be used.

JP '639A discloses that adding crosslinking agent and additive is for improving the water-absorptivity of the crosslinked composite. Regarding the crosslinking agent, JP '639 discloses that the crosslinking agent may be a water-soluble ethylene-type unsaturated polyvalent monomer, a polyol, and a polyamine. However, regarding the additive, there is only one sentence in JP '639A that discloses that the additive is a pulverized filler of talc, clay and diatomaceous earth. JP '639A neither teaches nor suggests that the clay is water swelling. Of course, JP '639A neither teaches nor suggest that the composite is crosslinked by interaction between the polymer and the clay to form a three-dimensional network structure. Rather, the reference discloses that it is the crosslinker that links the polymers to form the crosslinked composite.

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Claim 1, as amended, recites that the organic polymer (A) and the water swelling clay mineral (B) interact to form a three dimensional network structure, and the present claims therefore, are not obvious over JP '639A.

Claims 1-5 and 9 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Lorah et al. (US 2002/0055581 A1 or US 2002/0058739 A1). (Office action page 5)

Reconsideration of the rejection is respectfully requested.

First of all, the materials in Lorah et al. are different from the starting materials used to form the claimed polymer composite. Specifically, the clays in Lorah et al. are hydrophobically modified clays and, therefore, are *not* water-swelling as required in water-swelling clay mineral (B).

Lorah et al. do not suggest the use of a water-swelling clay mineral, because the clay/polymer composition of Lorah et al. is prepared by an emulsion polymerization. In order to disperse the clays into a monomer phase, it is necessary to hydrophobically modify the clays in Lorah et al. By contrast, in the present invention, the clay/polymer composition is prepared by a solution polymerization. So, this present invention needs a water-swelling clay rather than a hydrophobically modified clay.

The monomers in Lorah et al. are ethylenically unsaturated monomers. For example, U.S. '581 (in paragraphs [0031] to [0032]) discloses many types of monomers, including not only alkyl(meth)acrylates but also vinyl aromatic monomers. U.S. '581 also discloses that for the purposes of preparing a composite having desirable resistance to weathering, for the purposes

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of providing low cost and commercially available nanocomposite dispersions, or for the purposes of using the aqueous nanocomposite dispersions for preparing coatings and adhesives, it is preferable to use monomers selected from the class of alkyl(meth)acrylates.

However, Lorah et al. does not disclose that using a **water-soluble (meth)acrylate ester** as a monomer is required. And Lorah et al. does not suggest using a **water-soluble (meth)acrylate ester** as a monomer in the polymerization of the composite. The **water-soluble (meth)acrylate ester** is required in claim 1.

In the present invention, it is necessary to dissolve a water-soluble monomer in water to form an aqueous solution (other than an emulsion), and to disperse the water-swelling clay mineral in the solution, in order to produce a clay/polymer composite with the three-dimensional network structure, which is formed by interaction between the organic polymer (A) and the water-swelling clay mineral (B).

In addition, the Lorah et al. patents disclose different process conditions and, as a consequence, inherently different products.

Specifically, the polymerization of Lorah et al. is an emulsion polymerization, and the polymerization of the present invention is a solution polymerization. The solution polymerization is explicitly recited in new claims 13-16, which recite that the product is prepared by a process involving a uniform solution of component (a).

The product of Lorah et al. is a sol (or a colloid), in which the polymer/clay nanocomposite particles are dispersed in the aqueous solution. However, the product of the present invention is a solid polymer/clay composite with a three-dimensional network structure,

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and the composite is able to become a gel after absorbing water in the three-dimensional network structure (see page 10, lines 7 to 23, of the present specification).

For example, as disclosed in paragraph [0112] of U.S. '581, the clay dispersion was prepared by mixing 481.10 grams water, 333 grams methyl methacrylate (MMA), and 16.65 grams clay suspension agents, as well as suspension agents. Most of the MMA is dispersed in water to form an emulsion instead of being dissolved in water to form a solution. The polymer/clay composition is prepared by the polymerization of MMA in the liquid mixed by MMA-water emulsion and clay-water dispersion.

In the present invention, in order to prepare the composite with the three-dimensional network structure, which is formed from interaction between the organic polymer (A) and the water-swelling clay mineral (B), the polymer/clay composition is prepared by the polymerization of MAE in the liquid mixed by MAE-water solution and clay-water dispersion, after dispersing a water-swelling clay mineral (B), and dissolving a water-soluble (meth)acrylate ester (a:MAE) in water.

Therefore, Lorah et al. neither discloses nor suggests the claimed composition with the three-dimensional network structure, which is formed from interaction between the organic polymer (A) and the water-swelling clay mineral (B) and is able to become a gel after absorbing water. Lorah et al. neither discloses nor suggests preparing this type of composite by using a solution polymerization. The claims are therefore not obvious over Lorah et al. '581 and '739.

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Claims 6-8 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent from including all of the limitations of the base claim and any intervening claims. (Office action page 5)

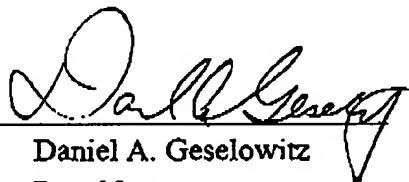
Reconsideration of the objection is requested in view of the amendment to claim 1.

To the extent necessary during prosecution, Applicants hereby request any required extension of time not otherwise requested and hereby authorize the Commissioner to credit any overpayment or charge any required fee not otherwise paid, including application processing, extension, and extra claims fees, to Deposit Account No. 01-2340.

Respectfully submitted,

KRATZ, QUINTOS & HANSON, LLP

By:



Daniel A. Geselowitz

Reg. No. 42,573

Docket No. 040183
1420 K Street, NW, Suite 400
Washington, DC 20006
(202) 659-2930

**23850**

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